DRÆM – A discriminatively trained reconstruction embedding for surface anomaly detection

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Abstract

Visual surface anomaly detection aims to detect local image regions that significantly deviate from normal appearance. Recent surface anomaly detection methods rely on generative models to accurately reconstruct the normal areas and to fail on anomalies. These methods are trained only on anomaly-free images, and often require hand-crafted post-processing steps to localize the anomalies, which prohibits optimizing the feature extraction for maximal detection capability. In addition to reconstructive approach, we cast surface anomaly detection primarily as a discriminative problem and propose a discriminatively trained reconstruction anomaly embedding model (DRÆM). The proposed method learns a joint representation of an anomalous image and its anomaly-free reconstruction, while simultaneously learning a decision boundary between normal and anomalous examples. The method enables direct anomaly localization without the need for additional complicated post-processing of the network output and can be trained using simple and general anomaly simulations. On the challenging MVTec anomaly detection dataset, DRÆM outperforms the current state-of-the-art unsupervised methods by a large margin and even de-livers detection performance close to the fully-supervised methods on the widely used DAGM surface-defect detection dataset, while substantially outperforming them in localization accuracy. Code at github.com/VitjanZ/DRAEM.